

Dr William Adam's iconography of Central and West African *Gulella* species (Gastropoda Pulmonata: Streptaxidae).

Part 3: nine new species from the D.R.Congo

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Abstract

Nine new species of *Gulella s.l.* are described from the eastern parts of the Democratic Republic of Congo, *i.e.* *G. garambae* sp. nov. from the Garamba National Park; *G. (Paucidentina) lievrouwi* sp. nov. from Lakes Kivu, Edward, and Albert Hydrobiological Exploration (1952-1954); *G. ectodentata* sp. nov., *G. ruwenzoriensis* sp. nov., *G. cupula* sp. nov., *G. virungae* sp. nov. and *G. selene* sp. nov. from the Virunga National Park; *G. (Silvigulella) turriiformis* sp. nov. and *G. albinus* sp. nov. from the Upemba National Park. All species are described as shells only. Some of the new species are very characteristic indeed while others represent seemingly ordinary combinations of characters.

Key-words: Gastropoda, Pulmonata, Streptaxidae, *Gulella*, Africa, D.R.Congo, systematics.

Résumé

Neuf espèces nouvelles du genre *Gulella s.l.* provenant de la région orientale de la République Démocratique du Congo sont décrites, notamment *G. garambae* sp. nov. du Parc National de la Garamba; *G. (Paucidentina) lievrouwi* sp. nov. résultant de l'Exploration hydrobiologique des lacs Kivu, Edouard et Albert

(1952-1954); *G. ectodentata* sp. nov., *G. ruwenzoriensis* sp. nov., *G. cupula* sp. nov., *G. virungae* sp. nov. et *G. selene* sp. nov. du Parc National des Virunga, *G. (Silvigulella) turriiformis* sp. nov. et *G. albinus* sp. nov. du Parc National de l'Upemba. La description de toutes les espèces se base sur la coquille seule. Parmi les espèces nouvelles, certaines sont très caractéristiques, d'autres représentent apparemment une nouvelle combinaison de caractères ordinaires.

Mots-clefs: Gastropoda, Pulmonata, Streptaxidae, *Gulella*, Afrique, R.D. Congo, systématique.

Introduction

Parts 1 and 2 of this series (VAN BRUGGEN & VAN GOETHEM, 1997; 1998) deal with nominal species of *Gulella* and a new species of the taxon *Wilmattina* for which illustrations by Mrs J. VAN MELDEREN-SERGYSELS were found among the papers left by the late Dr W. ADAM (1909-1988); for the introduction to this series see VAN BRUGGEN & VAN GOETHEM, 1997: 6. The remaining professional drawings of *Gulella* from her hand represent nine as yet undescribed taxa from the Democratic Republic of Congo, variously represented by singletons, small or larger series of shells. Our recent research efforts have focused on these and descriptions are supplied below.

The shell characters of the streptaxid genus *Gulella* L. PFEIFFER, 1856, have been discussed by VAN BRUGGEN & VAN GOETHEM (1997: 6-7); anatomical data are few and far between and their significance for the systematics of the genus *sensu lato* cannot be evaluated yet. Unfortunately only one of the species is represented by material in alcohol from which data on radula and genitalia will be discussed elsewhere.

For details on the geography, ecology, etc. of the various Congo national parks and Lakes Kivu, Edward, and Albert Hydrobiological Exploration the student is referred to the general introductory treatises (KEA: VERBEKE, 1957; PNG: DE SAEGER, 1954; PNU: DE WITTE *et al.*, 1966; PNV: DE WITTE, 1937).

Generally no subgenera have been indicated; such subdivisions have as yet little meaning, because these taxa have not been properly delineated. However, there are two exceptions, *Gulella lievrouwi* very probably belongs to *Paucidentina* and *G. turriiformis* undoubtedly should be classified with *Silvigulella*, whatever status this taxon has.

All holotypes and most of the paratypes are in the Royal Belgian Institute of Natural Sciences, Brussels (RBINS); some paratypes have been deposited as duplicates in the National Museum of Natural History, Leiden (RMNH).

Abbreviations used

Museums

RBINS Royal Belgian Institute of Natural Sciences, Brussels (Institut royal des Sciences naturelles de Belgique, Bruxelles / Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel)

RMNH National Museum of Natural History, Leiden (Nationaal Natuurhistorisch Museum, formerly Rijksmuseum van Natuurlijke Historie, Leiden)

Geography

D.R.Congo Democratic Republic of Congo (formerly Zaïre)

ex The addition of 'ex' to a national park abbreviation (e.g. *ex* PNV) indicates a locality in the area immediately adjoining the national park in question

KEA Lakes Kivu, Albert, and Edward Hydrobiological Exploration (1952-1954)

PNG Garamba National Park (Parc National de la Garamba), D.R.Congo

PNU Upemba National Park (Parc National de l'Upemba), D.R.Congo

PNV Virunga National Park [Parc National des Virunga, formerly Albert National Park/Parc National Albert, officially divided into three sectors, i.e. the northern (north of Lake Edward), central (around and south of Lake Edward), and southern (from the Rutshuru River to Lake Kivu) sectors], D.R.Congo

Sta. Station (= locality)

Shell

alc. specimens in alcohol

h height

l length

l/d the ratio length/major diameter as an indication of the shape of the shell. (In a number of cases the l/d has been calculated from micrometer readings, so that the l/d values do not always agree with those calculated from the dimensions in mm.)

hw height last whorl (body whorl) in front view

w width (= major diameter)

A new species from the Garamba National Park

The Garamba National Park was created in 1938. It is the northernmost national park in the D.R.Congo, being situated in the north-eastern corner of the country on the borders of the Sudan. Nowadays it is the last stronghold

of the northern white rhinoceros (*Ceratotherium simum cottoni*) in the wild. During extended surveys of the area almost half a century ago (*vide* DE SAEGER, 1954) a new species of *Gulella* was discovered.

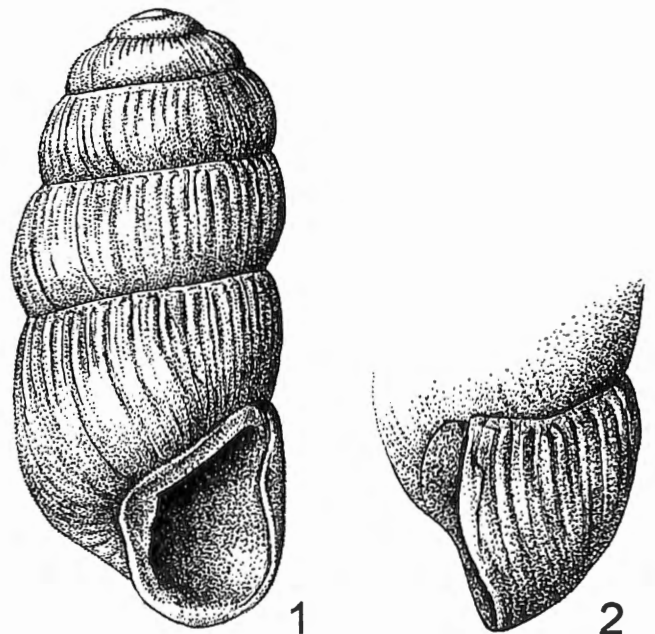
Gulella garambae sp. nov. (Figs 1-2)

DIAGNOSIS

A species of *Gulella* characterized by a medium-sized subcostulate shell with about six whorls and no apertural dentition, but with a sinuous outer lip.

DESCRIPTION

Shell (Figs 1-2) medium-sized, slender, cylindrical, sides almost parallel, greatest width below the middle, creamy white, (semi)transparent when fresh. Umbilicus completely closed or at most very slightly rimate. Spire produced, apex flattened, obtusely conical. Whorls about six, fairly convex, smoothish, covered with little prominent axial sculpture in the form of vague, distant and oblique costulae. High magnification reveals vague traces of fine spiral sculpture. Sutures shallow, simple and filiform to subcrenellate. Aperture squarish to subovate, peristome somewhat incrassate and reflected, without any trace of apertural dentition. Outer lip sinuous in profile (Fig. 2). Measurements of shell: 5.2-6.6 x 2.5-2.8 mm, l/d 2.10-2.51, height last whorl 3.1-3.4 mm, aperture 1.9-2.2 x 1.5-1.8 mm, 5 3/4-6 1/2 whorls (see Table 1). Holotype (Figs 1-2) 5.7 x 2.6 mm, l/d 2.24, height last whorl 3.2 mm, aperture 2.0 x 1.5 mm, 5 3/4 whorls.



Figs 1-2. *Gulella garambae* sp. nov., holotype, D.R.Congo, PNG 612, Sta. II/gc/8, 5.7 x 2.6 mm (RBINS).

ANATOMY

To be published elsewhere.

DISTRIBUTION

So far only known from the Garamba National Park in the Eastern Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Eastern Province, Garamba National Park, Garamba River, left side, source between Kiliwa and Nambira Rivers, alt. ± 700 m, 45 km NW of Faradje.

MATERIAL EXAMINED

D.R.Congo, Eastern Province, Garamba National Park, Sta. Mande, ± 700 m, dense wooded savanna, swampy, 5.IV.1950, leg. H. DE SAEGER (PNG 103: 1 paratype and 1 juv. RBINS); Sta. I/0/1, ± 700 m, Bagbele, just outside of PNG NW of Aka River, wooded savanna, in underground nesthole of unstriped ground squirrel, *Xerus erythropus* DESMAREST, 1817, 8.XI.1950, leg. J. VERSCHUREN (PNG 280: 1 paratype and 1 juv. RBINS); Sta. II/gc/8, ± 700 m, see type-locality, 16.V.1951, leg. H. DE SAEGER (PNG 612: holotype, Figs 1-2, and 1 paratype, RBINS; 1 paratype RMNH - all alc.); Sta. II/gd/4, ± 700 m, 16-29.V.1951, leg. H. DE SAEGER (PNG 677: 1 paratype and 1 juv. RBINS, both alc.); Sta. II/gd/8, ± 750 m, 28.IX.1951, leg. P. SCHOEMAKER, source in savanna, between decaying herbs (PNG 1208: 1 paratype RBINS, alc.); Sta. II/gd/6, ± 700 m, 11.X.1951, leg. H. DE SAEGER, grass savanna (PNG 1302: 2 paratypes RBINS, alc.); Sta. Ndelele River, ± 900 m, 19.VI.1952, leg. H. DE SAEGER, in humus between rocks, dry season (PNG 1870: 1 juv. RBINS, alc.); Sta. II/gd/4, ± 700 m, 07.VIII.1952, leg. H. DE SAEGER, grass savanna, in soil between 0-10 cm (PNG 1985: 2 paratypes RBINS, alc.). Detailed descrip-

tions of the stations, often with photos, can be found in DE SAEGER (1954). All juvenile specimens have been expressly excluded from the type series.

ETYMOLOGY

The new species is named after the Garamba National Park, which derives its name from the Garamba River (*garambae*, Latin, genitive of *garamba*), a tributary of the Uele River. Dr ADAM had already used this name as a manuscript name on the figures.

DISCUSSION

The somewhat featureless shell is nonetheless quite characteristic by its shape, sculpture and aperture. A number of juvenile specimens shows that at no stage in its lifetime there is any hint of apertural dentition.

A fair number of species classified with *Gulella* have shells with an aperture without dentition. However, apart from this, *Gulella garambae* appears to exhibit a unique set of characters. In East Africa *G. hemmingi* VERDCOURT, 1963 (*vide* VERDCOURT, 1963: 411, 415, fig. 10) vaguely resembles the new species, but *G. hemmingi* has a smaller shell (3.9-4.5 mm) with more whorls (7 1/2), a much more pronounced costulation and at least a sinus in the aperture, but also occasionally a minor parietal process and a thickening of the outer lip.

A paratype and a juvenile were collected alive in the underground nest of an unstriped ground squirrel [*Xerus erythropus* DESMAREST, 1817, *vide* VERHEYEN & VERSCHUREN, 1966: 27, *s.n.* *Euxerus erythropus lacustris* (THOMAS, 1905); see also VERSCHUREN, VAN DER STRAETEN & VERHEYEN, 1983: 50].¹ These ground squirrels dig burrows

¹ Sciuridae/Rodentia, *vide* VERSCHUREN, VAN DER STRAETEN & VERHEYEN, 1983: 50, "... si commun dans le Nord-Est du Zaïre, en particulier au Parc National de la Garamba, ...".

Table 1. Measurements in mm of eleven shells of the type series of *Gulella garambae* sp. nov. The holotype (Figs 1-2) is marked by an *; all other shells are paratypes. Two shells (PNG 1302 and 612) have their aperture completely blocked by the protruding animal, so that certain measurements could not be taken.

Locality	l x w	l/d	hw	h x w aperture	whorls	dry/alc.
PNG 280	5.2 x 2.5	2.10	3.2	1.9 x 1.7	5 3/4	dry
PNG 677	5.7 x 2.6	2.17	3.1	2.1 x 1.5	5 3/4	alc.
* PNG 612	5.7 x 2.6	2.24	3.2	2.0 x 1.5	5 3/4	alc.
PNG 1985	5.8 x 2.6	2.27	3.1	1.9 x 1.6	5 3/4	alc.
PNG 612	6.1 x 2.7	2.25	3.3	2.1 x 1.6	5 3/4	alc.
PNG 1302	± 6.1 x 2.6	± 2.31	-	-	± 6	alc.
PNG 612	± 6.2 x 2.6	± 2.38	± 3.1	-	<6	alc.
PNG 1985	6.3 x 2.6	2.46	3.4	2.2 x 1.6	5 3/4	alc.
PNG 1208	6.3 x 2.7	2.35	3.3	2.1 x 1.6	5 3/4	alc.
PNG 1302	6.4 x 2.6	2.51	3.4	2.1 x 1.6	<6	alc.
PNG 103	6.6 x 2.8	2.36	3.2	2.1 x 1.8	6 1/2	dry

that undoubtedly supply sufficient moisture to constitute an environment congenial to terrestrial snails and, of course, also their predators, *i.e.* *Gulella garambae* in this case.

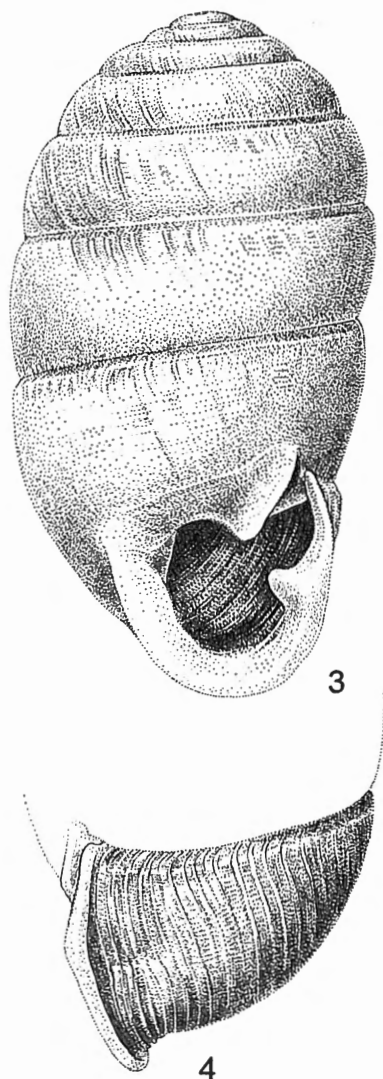
A new species from Lakes Kivu, Edward, and Albert Hydrobiological Exploration (1952-1954)

During surveys of the three Albertine Rift Valley Lakes Kivu, Edward, and Albert (KEA; *vide* VERBEKE, 1957) some terrestrial material was also taken, including a new species of *Gulella* presenting a generalized type of shell.

Gulella (Paucidentina) lievrouwi sp. nov. (Figs 3-4)

DIAGNOSIS

A species of *Gulella* characterized by a medium-sized smooth shell with seven and three-quarter whorls and with four-fold apertural dentition, consisting of an angular



Figs 3-4. *Gulella (Paucidentina) lievrouwi* sp. nov., holotype, D.R.Congo, KEA Sta. 179, Lake Kivu, Idjwi Island, 8.6 x 4.5 mm (RBINS).

lamella, a labral tubercle, a very weak outer and a modest inner columellar process.

DESCRIPTION

Shell (Figs 3-4) medium-sized, cylindrical-ovate to elliptical, greatest width at about the middle, creamy white, (semi)transparent when fresh. Umbilicus completely closed. Spire produced, sides somewhat convex, apex flattened, obtusely conical. Whorls seven and three quarters, slightly convex, smooth, but with traces of obsolete costulation below the sutures and very vague indications of spiral engraving, distant but noticeable costulation behind the labrum, apical whorls smooth. Sutures shallow, simple and filiform. Aperture subtriangular to subovate, peristome somewhat incrassate and reflected, hardly obstructed by four-fold dentition: a strong, oblique angular lamella, free from apex of labrum; a superficial, triangular labral process above the middle of labrum, corresponding to a modest shallow outside depression (Fig. 4); a superficial, very weak and hardly noticeable outer/upper columellar process which is nothing but a local swelling of the labrum; a deeply set inner columellar process in the form of a slightly incrassate columella.

Measurements of shell: 8.5-8.6 x 4.4-4.5 mm, l/d 1.92-1.94, height last whorl 4.4 mm, aperture 2.9-3.0 x 2.6-3.0 mm, 7 3/4 whorls. Holotype (Figs 3-4) 8.6 x 4.5 mm, l/d 1.92, height last whorl 4.4 mm, aperture 3.0 x 3.0 mm, 7 3/4 whorls; paratype 8.5 x 4.4 mm, l/d 1.94, height last whorl 4.4 mm, aperture 2.9 x 2.6 mm, 7 3/4 whorls. Anatomy unknown.

DISTRIBUTION

So far only known from the type locality in the Lake Kivu area in the D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, Lake Kivu, Idjwi Island, Busibu Bay, forest on south shore, 1462 m.

MATERIAL EXAMINED

D.R.Congo, Kivu Province, Lake Kivu, Idjwi Island, Busibu Bay, forest on south shore, 1462 m, 4.IX.1953 (KEA Sta. 179: holotype, Figs 3-4, and 1 paratype RBINS).

ETYMOLOGY

This new species is named after Mr Antoine LIEVROUW, senior technical officer (RBINS), who has for many years (1949-1995) ably assisted the late Dr W. ADAM and also the junior author in their work on the land molluscs of Africa.

DISCUSSION

Although only two specimens are available for study, it appears that the combination of size and shape, general absence of costulation, and limited apertural dentition is as yet unknown. Incidentally, the apertural dentition may also be interpreted as three-fold, because the outer columellar process may be considered as (almost) absent. Checking through major works and running down keys where available, such as PILSBRY (1919), CONNOLLY (1939), VERDCOURT (1962) and subsequent descriptions, does not lead to an even vaguely satisfactory result. Reference should be made to VERDCOURT (1962) and ADAM (1965). The former features the *G. pervitrea* (PRESTON, 1913) complex on p. 14 and depicts a shell on pl. IV fig. 1; however, resemblance to *G. lievrouwii* sp. nov. seems hardly in question here. The same more or less applies to ADAM (1965: 25-26, pl. II fig. 1) who discusses and depicts *G. meruensis* (D'AILLY, 1911). This taxon recalls *G. lievrouwii* sp. nov. but this has an obviously different sculpture on the whorls and a lower value for l/d (1.92-1.94 instead of >2.00).

Five new species from the Virunga National Park

The Virunga National Park (PNV), formerly known as the Albert National Park (PNA), is the oldest national park in the D.R.Congo (park created in 1925) and stretches over much of the eastern territories of this country on the borders of Uganda. This national park has been repeatedly visited by scientists for various types of studies, which has resulted in considerable collections of terrestrial molluscs among others. Five new species of *Gulella* from these surveys are described below.

Gulella ectodentata sp. nov.
(Figs 5-6)

DIAGNOSIS

A species of *Gulella* characterized by a small costulate shell with apical spiral sculpture, about six whorls, and with seven-fold apertural dentition, consisting of angular lamella, two labral processes, a weak basal tubercle, and two superficial columellar denticles in addition to an inner columellar process.

DESCRIPTION

Shell (Figs 5-6) small, (sub)cylindrical, greatest width at the penultimate whorl, (semi)transparent. Umbilicus completely closed. Spire produced, sides (sub)parallel, apex flattened, obtusely conical. Whorls slightly more than six, slightly convex, covered with distant and prominent axial, slightly oblique and straight, costulae, the interstices much wider than the costulae, smooth or with some vertical sculpture; apical whorls smoothish,

with marked spiral engraving. In front view c. 20 costulae may be discerned on the body whorl above the aperture. Sutures shallow, simple, filiform to subcrenellate. Aperture subovate, peristome somewhat incrassate and reflected, moderately obstructed by seven-fold dentition: a large, superficial, almost perpendicular inrunning angular lamella, connected with apex of labrum; a large labral complex consisting of a small upper and a larger lower, mamillate process on a common base, the complex corresponding to a noticeable outside depression (Fig. 6); a basal process in the form of a hardly noticeable, weak inside swelling; two equal superficial denticles on the columellar lip, the lower to the left of the base, the upper above the middle; a large and deeply set mamillate to subquadrate columellar complex.

Measurements of shell: 3.9 x 1.7 mm, l/d 2.32, height last whorl 1.9 mm, aperture 1.3 x 1.0 mm, >6 whorls (holotype, Figs 5-6).

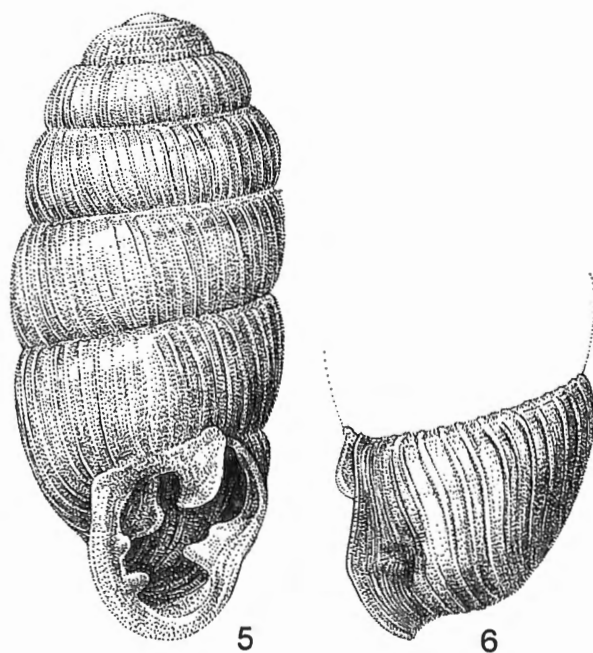
Anatomy unknown.

DISTRIBUTION

So far only known from the type locality just outside the northern sector of the Virunga National Park, Kivu Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, just outside the northern sector of the Virunga National Park, Abyalose River, tributary of the Djuma River, 800 m.



Figs 5-6. *Gulella ectodentata* sp. nov., holotype, D.R.Congo, PNV 512, Abyalose River, 3.9 x 1.7 mm (RBINS).

MATERIAL EXAMINED

D.R.Congo, Kivu Province, just outside the northern sector of the Virunga National Park, Abyalose River, tributary of the Djuma River, 800 m, 12.VI.1953 (PNV 512: holotype, Figs 5-6, RBINS).

ETYMOLOGY

The specific epithet, the adjective *ectodentata*, refers to the presence of superficial denticles on the columellar side of the aperture, *ecto-* (Latin) = outside, *dentatus* (Latin) = toothed.

DISCUSSION

The apertural dentition may also be interpreted as six-fold because of the weakly developed basal process. Although this new taxon is only represented by a single fresh shell in perfect condition, it is evidently an undescribed species. The combination of characters (the costulate shell with spirally engraved apex and a seven-fold dentition as described above) does not seem to have been met with so far.

Outer columellar processes do occur throughout the genus *Gulella* s.l. and do not necessarily reflect relationships. The shell of *G. uluguruensis* VERDCOURT, 1962, indeed has outer columellar teeth, but otherwise is utterly different. The new species should be compared to the *G. pervitrea* (PRESTON, 1913) complex as depicted by VERDCOURT (1962, pl. IV); however, all appear to be distinct, e.g. having smooth shells, etc. VAN BRUGGEN (1980: figs 8-11) also figures shells with outer columellar processes, e.g. *G. elliptica* (MELVILL & PONSONBY, 1898) and *G. natalensis* (CRAVEN, 1880) (VAN BRUGGEN, 1980: fig. 29), but none of these do compare satisfactorily to *G. ectodentata* sp. nov.

Gulella ruwenzoriensis sp. nov.
(Fig. 7)

DIAGNOSIS

A species of *Gulella* characterized by a small, finely costulate shell with about five whorls and a six-fold apertural dentition consisting of angular lamella, two-fold labral complex, basal denticle, and outer and inner columellar processes.

DESCRIPTION

Shell (Fig. 7) small, subovate, greatest width at the penultimate whorl, semitransparent. Umbilicus completely closed. Spire produced, sides subparallel, apex flattened,

obtusely conical. Whorls slightly more than five, convex, covered with little prominent, fairly dense, costulation in the form of very fine, slightly oblique and almost straight costulae, which are much more pronounced behind the labrum; apical whorls smooth and slightly pitted. Sutures shallow, simple, filiform to very slightly subcrenulate. Aperture squarish to subovate, somewhat obstructed by six-fold dentition: a large, obliquely vertical angular lamella, hardly connected to apex of labrum; a comparatively large labral complex consisting of a small upper and a much larger lower process on a common base, the complex corresponding to a shallow, but noticeable outside depression; a deeply set left basal denticle; a large, mamillate, superficial outer columellar process, almost opposite labral denticle, and an insignificant inner columellar process in the form of a slightly incrassate columella.

Measurements of shell: 2.9 x 1.5 mm, l/d 1.88, height last whorl 1.6 mm, aperture 1.1 x 0.9 mm, >5 whorls (holotype, Fig. 7).

Anatomy unknown.

DISTRIBUTION

So far only known from the type locality in the northern sector of the Virunga National Park, Kivu Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, northern sector of the Virunga National Park (PNV), Ruwenzori, Kerere, between Mahungu (3300 m) and Kiondo (4300 m).



Fig. 7. *Gulella ruwenzoriensis* sp. nov., holotype, D.R.Congo, PNV, Ruwenzori, Kerere, 2.9 x 1.5 mm (RBINS).

MATERIAL EXAMINED

D.R.Congo, Kivu Province, northern sector of the Virunga National Park (PNV), Ruwenzori, at Kerere River (3700-3990 m), tributary of Nyamwamba (= Nyamuamba) River, between Mahungu (3300 m) and Kiondo (4300 m), among mosses, II.1957 (holotype, Fig. 7, RBINS).

ETYMOLOGY

The new taxon is named after the Ruwenzori mountain complex in East/Central Africa, particularly because of the altitude of the type locality.

DISCUSSION

Although this species also is represented by a single fresh shell in good condition, it is clearly an as yet undescribed taxon. The size, shape and sculpture, combined with the apertural dentition represents an obviously new combination of characters in the genus *Gulella* s.l.

G. ruwenzoriensis sp. nov. does show some similarity to *G. shoaensis* VERDCOURT, 1985, the shell of which, however, is larger (length 5.5 mm) and more slender (i.e. has a higher l/d value), and also has a much more pronounced apertural dentition. Another species with a shell that recalls that of *G. ruwenzoriensis* sp. nov. is *G. zemenensis* VERDCOURT, 1990, which is even larger (5.5-5.7 mm) and has a considerably more pronounced columellar complex in the aperture.

The single available shell was found at an altitude of between 3700 and 3990 m. It is a moot point whether this would allow us to consider it a high altitude species. Nevertheless some speculation on this phenomenon may be in order here. The number of *Gulella* taxa (or for that matter species of the family Streptaxidae) known to occur above 3000 m is limited. The climate at that altitude in the Ruwenzori mountains may perhaps be considered somewhat hostile for members of a family generally restricted to tropical environments. Small size would certainly contribute to survival in an unfriendly habitat. Streptaxidae and particularly *Gulella*, have not infrequently been recorded from high altitudes. Already in 1923 GERMAIN (1923: 19) stated "Les *Gulella* sont des animaux qui paraissent très répandus dans toute l'Afrique Orientale, aussi bien dans les pays de plaine que dans les régions montagneuses où ils s'élèvent jusqu'à 2.000, 2.500, et, plus rarement, 3.000 mètres." Examples of *Gulella* taxa reported from above 2,000 m are *G. ndamanyiluensis* VENMANS, 1956 (VERDCOURT & VENMANS, 1956), *G. kulalensis* VERDCOURT, 1962 (VERDCOURT, 1962) and *Gulella viae* BURNUP, 1925 (VAN BRUGGEN, 1985). Many high altitude records (> 2,000 m) are given in ADAM (1965): *G. hanangi* ADAM, 1965, *G. cylindrica* (PFEIFFER, 1952), *G. montium* (D'AILLY, 1910), *G. puella* CONNOLLY, 1929, *G. meruensis* (D'AILLY, 1910), *G. labiotuberculata* CONNOLLY, 1942, *G. tudes* (VON MARTENS, 1895),

G. duncani CONNOLLY, 1930, *G. commoda* (SMITH, 1903), *G. olkokolae* ADAM, 1965, *G. coarctata* (D'AILLY, 1910), *G. moloensis* ADAM, 1965. The maximum recorded altitude in this paper is 4,200-4,600 m for *G. montium* on Mt. Kilimanjaro in Tanzania (ADAM, 1965: 22), which may be the all-time high altitude reached by the genus.

All species mentioned in this context vary in length of the shell; although there are some small shells in this series, at least five taxa have shells that are longer than 10 mm. This in itself would at least throw a doubtful light on the surmised evolutionary advantage of small size in high altitude environments.

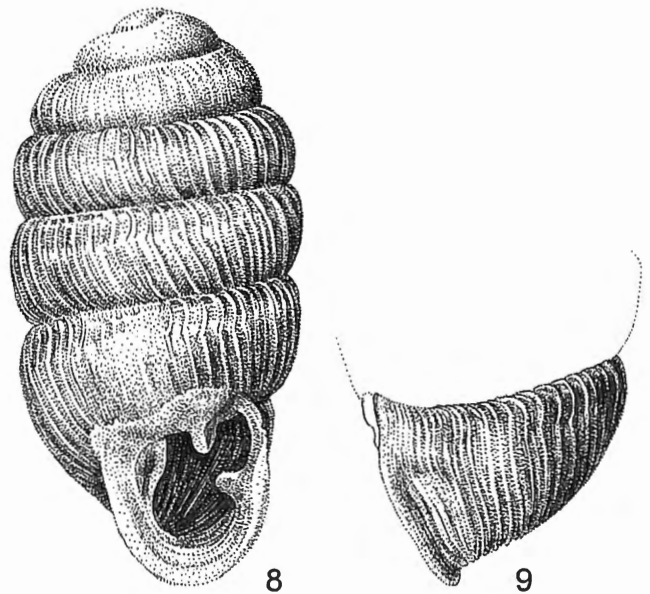
Gulella cupula sp. nov.
(Figs 8-9)

DIAGNOSIS

A species of *Gulella* characterized by a small costulate shell with about five and a half whorls and with three-fold apertural dentition consisting of angular lamella, labral denticle, and columellar lamella.

DESCRIPTION

Shell (Figs 8-9) small, subovate, greatest width slightly below the middle, (semi)transparent. Umbilicus completely closed. Spire produced, sides (sub)parallel, apex flattened, obtusely conical. Whorls five and a half, convex, covered with fairly crowded and prominent (slightly) oblique and curved or wavy costulae; apical whorls smooth and somewhat pitted, with early faint traces of costulation. In front view c. 24 costulae may be discerned on the body whorl above the aperture. Sutures shallow, simple and filiform to subcrenellate. Aperture subovate, peristome



Figs 8-9. *Gulella cupula* sp. nov., holotype, D.R.Congo, PNV 1952-1957, DONIS Z.3124, Mugunga, road Sake-Goma, 3.6 x 1.9 mm (RBINS).

somewhat incrassate and reflected, hardly obstructed by three-fold dentition: a modest, perpendicular, inrunning angular lamella, not or hardly connected to apex of labrum; a labral denticle just above the middle of the labrum, corresponding to a shallow outside depression (Fig. 9); a modest, submamillate columellar lamella.

Measurements of shell: 3.6 x 1.9 mm, l/d 1.90, height last whorl 1.7 mm, aperture 1.2 x 1.2 mm, whorls 5 1/2 (holotype, Figs 8-9).

Anatomy unknown.

DISTRIBUTION

So far only known from the type locality in the southern sector of the Virunga National Park, Kivu Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, southern sector of the Virunga National Park, Mugunga on the road Sake-Goma (km 193), 1500 m.

MATERIAL EXAMINED

D.R.Congo, Kivu Province, southern sector of the Virunga National Park, Mugunga on the road Sake-Goma (km 193), 1500 m, 15.VII.1957 (PNV 1952-1957, DONIS Z.3124: holotype, Figs 8-9, RBINS).

ETYMOLOGY

This species has been named *cupula* (Latin, a noun in apposition), diminutive of *cupa* (Latin) = cask, barrel, butt, or tun, in allusion to the shape of the shell.

DISCUSSION

Although the apertural configuration of the shell of *G. cupula* sp. nov. represents a common type of dentition, it appears that it is a hitherto unrecorded species. The three-fold apertural dentition combined with the marked close costulation and small size of the shell form an unique combination of characters. In VERDCOURT's classic treatment (1962) e.g. it would run down to Keys 7 and/or 8, but in going through the couplets of these keys one does nowhere reach an even mildly satisfactory result. Comparison with the many descriptions in more recent publications on these streptaxids obviously also does not lead to a creditable result.

Gulella virungae sp. nov. (Fig. 10)

DIAGNOSIS

A species of *Gulella* characterized by a medium-sized costulate shell with apical spiral sculpture, about seven whorls, and with four-fold apertural dentition consisting of angular lamella, labral process, basal denticle and columellar lamella.

DESCRIPTION

Shell (Fig. 10) medium-sized, subcylindrical, greatest width about the middle, transparent when fresh. Umbilicus subrimate to almost completely closed. Spire produced, sides subparallel, apex flattened, obtusely conical. Whorls seven or slightly more, convex, covered with close and fairly prominent, straight and oblique costulae, apical whorls smoothish with marked spiral engraving. In front view 35-40 costulae may be discerned on the body whorl above the aperture. Sutures shallow, filiform to subcrenellate. Aperture squarish to subovate, peristome somewhat incrassate and reflected, moderately obstructed by four-fold dentition: a comparatively modest, almost perpendicular, angular lamella, not or hardly connected with apex of labrum; a large, mamillate mid-labral process, corresponding to an extensive shallow outside depression; a denticle in the middle or slightly to the left of the base; a large and prominent, mamillate columellar lamella. Measurements of shell: 4.7 x 2.1-2.3 mm, l/d 2.05-2.23, height last whorl 2.3-2.4 mm, aperture 1.5-1.6 x 1.4-1.5 mm, 7->7 whorls. Holotype (Fig. 10) 4.7 x 2.1 mm, l/d 2.23, height last whorl 2.3 mm, aperture 1.6 x 1.4 mm,

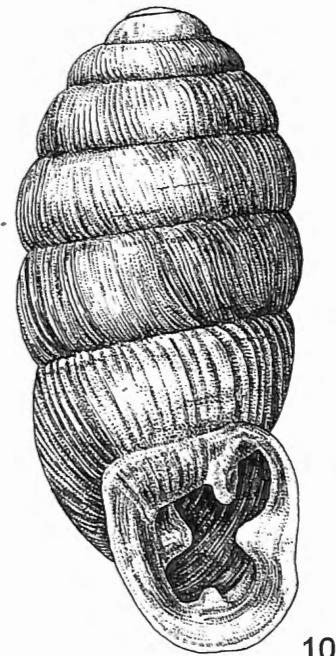


Fig. 10. *Gulella virungae* sp. nov., holotype, D.R.Congo, PNV, Ruwenzori, between Kiondolire and Kalonge, 4.7 x 2.1 mm (RBINS).

>7 whorls; paratype 4.7 x 2.3 mm, l/d 2.05, height last whorl 2.4 mm, aperture 1.5 x 1.5 mm, 7 whorls. Anatomy unknown.

DISTRIBUTION

So far the new species is only known from two localities in the northern sector of the Virunga National Park, Kivu Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, Virunga National Park, northern sector, Ruwenzori, between Kiondolire and Kalonge, 1750-2200 m.

MATERIAL EXAMINED

D.R.Congo, Kivu Province, Virunga National Park, Ruwenzori, between Kiondolire and Kalonge, 1750-2200 m, among mosses on trees, II.1957 (holotype, Fig. 10, RBINS); Virunga National Park, northern sector, Bombe (Bombo, Bombi), tributary of the Butahu River, gallery forest in savanna, 1100-1800 m (ex PNV), 1.XII.1953, leg. H. SYNAVE (PNV 1186: paratype RBINS).

ETYMOLOGY

The species is named after the range of mountains that is the backbone of the Virunga National Park.

DISCUSSION

Although the paratype is a distinctly worn shell, the apical spiral sculpture is still easily observed. Again, as observed in the discussion on the preceding species, *G. virungae* sp. nov. represents a fairly ordinary type of *Gulella* as regards size, shape, sculpture and apertural dentition. At first sight *G. virungae* sp. nov. is close to *G. lessensis* PILSBRY, 1919, as treated by VAN BRUGGEN & VAN GOETHEM (1997: 17-19, Figs 32-40). The new taxon certainly belongs to the *G. lessensis* group, but the shell is somewhat more slender (l/d 2.05-2.23 as against 1.74-2.12) and the costulation on the whorls is much more dense (35-40 costulae on the body whorl in front view as against 20-25 in *G. lessensis*). In addition, the four (groups of) apertural denticles are more or less equal in size in *G. virungae* sp. nov., while in *G. lessensis* there are always considerable discrepancies in the size of these denticles. VERDCOURT's 1962 work should also be studied. Here we have to refer to Keys 8 and 9, but a proper scrutiny once more does not lead to any result worth considering. Subsequent papers by VERDCOURT and others on species from Central Africa (and elsewhere)

obviously also do not materially assist in classifying *G. virungae* sp. nov. with a published species, reason why we consider it undescribed.

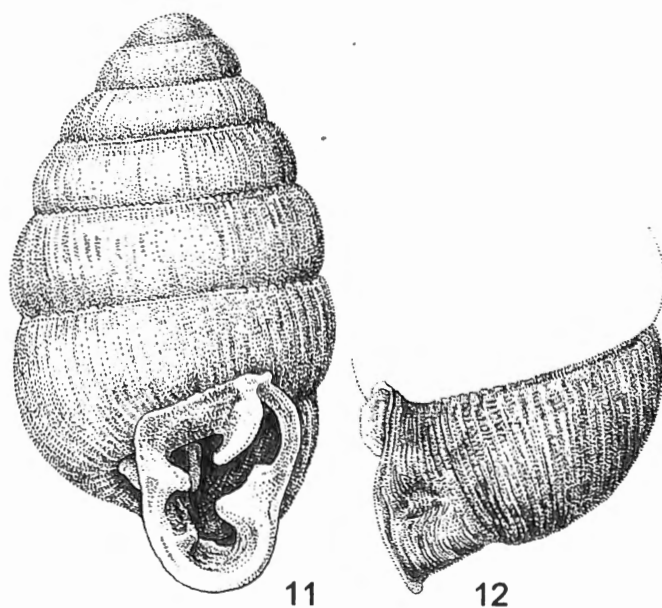
Gulella selene sp. nov. (Figs 11-12)

DIAGNOSIS

A species of *Gulella* characterized by a small tapering, practically smooth shell with about six whorls and with six-fold apertural dentition consisting of angular lamella, double labral process, basal denticle, and outer and inner columellar processes.

DESCRIPTION

Shell (Figs 11-12) small, acuminate ovate, tapering towards apex, greatest width at the penultimate whorl, (semi)transparent. Umbilicus rimate. Spire produced, sides converging, apex subacute, obtusely conical. Whorls six to six and a quarter, slightly convex, seemingly smooth, but in fact covered with weak and little prominent axial sculpture which normally is only discernible below the sutures and only really manifest behind the labrum; apical whorls completely smooth, although there is a hint of spiral engraving. Sutures shallow, simple, filiform to subcrenulate. Aperture subtriangular, peristome somewhat incrassate and reflected, moderately obstructed by six-fold dentition: a large, slightly oblique inrunning angular lamella, connected with apex of labrum; a large mamillate labral complex consisting of a minor upper tubercle (a mere swelling) and a major lower process, the complex



Figs 11-12. *Gulella selene* sp. nov., holotype, D.R.Congo, PNV 805, at Musabaki River, 3.7 x 2.2 mm (RBINS).

corresponding to a large and deep outside depression (Fig. 12); a left basal inrunning ridge; a fairly large upper/outer mamillate columellar denticle, and large inner columellar process.

Measurements of shell: 3.6-3.7 x 2.1-2.2 mm, l/d 1.71-1.73, height last whorl 1.8-1.9 mm, aperture 1.3-1.4 x 1.1-1.2 mm, whorls 6-6 1/4. Holotype (Figs 11-12) 3.7 x 2.2 mm, l/d 1.71, height last whorl 1.9 mm, aperture 1.4 x 1.1 mm, c. 6 whorls (apex damaged); paratype 3.6 x 2.1 mm, l/d 1.73, height last whorl 1.8 mm, aperture 1.3 x 1.2 mm, 6 1/4 whorls.

Anatomy unknown.

DISTRIBUTION

So far the new species is only known from two localities in the northern sector of the Virunga National Park, Kivu Province, D.R.Congo.

TYPE LOCALITY

D.R.Congo, Kivu Province, Virunga National Park, northern sector, at Musabaki (= Musavaki) River, 2720 m.

MATERIAL EXAMINED

D.R.Congo, Kivu Province, Virunga National Park, northern sector, Musabaki (= Musavaki) River, tributary of the Talya Nord River, Tshiaberimu region, bamboo forest, *Hagenia*, 2720 m, 25.VIII.1953 leg. P. VANSCHUYTBROECK & H. SYNAVE (PNV 805: holotype, Figs 11-12, RBINS); Virunga National Park, northern sector, Kalivina River, tributary of the Talya Nord River, Tshiaberimu region, bamboo forest, *Hagenia*, 1000-2720 m, 28.VIII.1953, leg. P. VANSCHUYTBROECK & H. SYNAVE (PNV 815: paratype RBINS).

ETYMOLOGY

The specific epithet, a noun in apposition, *selene* [Greek for (goddess of the) moon], refers to the Mountains of the Moon, an ancient name for the Ruwenzori mountain complex, where much of the Virunga National Park is located.

DISCUSSION

The apertural dentition may at time be interpreted as five-fold, because, as in the paratype shell, the upper labral tubercle (a mere swelling in the holotype shell) may be (almost) completely reduced.

It is clear that this new taxon belongs to the group discussed sub *G. browni* VAN BRUGGEN, 1969 (see discussion in VAN BRUGGEN, 1969: 71), generally charac-

terized by tapering costulate shells with varying apertural dentition. This group is widely distributed from Zululand in the South via Malawi (VAN BRUGGEN & MEREDITH, 1984: 165) northward to Kenya (VERDCOURT, 1983: 234). However, the new species, apart from showing evident differences in dentition, is outstanding because of its particularly weak axial sculpture.

Incidentally, AIKEN (1981) has shown that the radula sets *G. browni* apart from all other South African species as far as investigated; so far, none of the other species in this group (which may be paraphyletic) has been scrutinized as regards the radula.

Two new species from the Upemba National Park

The Upemba National Park was created in 1939. It is the southernmost national park in the D.R.Congo, situated in the central districts of Katanga (= Shaba) in the area of the lakes of the Lualaba River. This national park has been extensively surveyed in 1946-1949 (*cf.* DE WITTE *et al.*, 1966); large collections of molluscs were made by Dr W. ADAM and local assistants during a year-and-a-half in the period February 1948 - September 1949. Two remarkable new species of *Gulella* from the PNU are described below.

Gulella (Silvigulella) turriiformis sp. nov.

(Fig. 13)

DIAGNOSIS

A species of *Gulella*, subgenus *Silvigulella*, characterized by a medium-sized shell with apical spiral sculpture and up to eight whorls, and with two-fold apertural dentition, consisting of angular lamella and upper labral process.

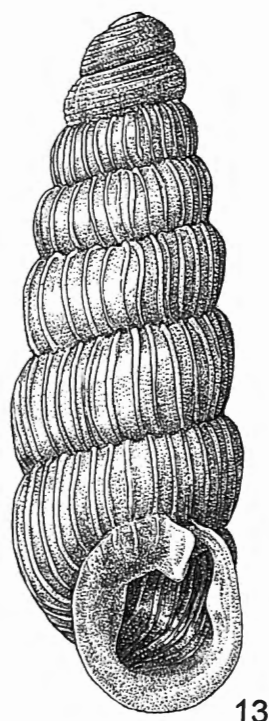
DESCRIPTION

Shell (Fig. 13) medium-sized, slender, elongate, clavate to turriiform, somewhat tapering, greatest width at the penultimate whorl, creamy white, (semi)transparent when fresh. Umbilicus completely closed. Spire produced, apex flattened, obtusely conical. Protoconch comparatively large, slightly swollen, with about two and a quarter convex whorls, second whorl about as high as first whorl of teleoconch, with marked spiral sculpture practically from the very beginning. Teleoconch with five and a half to five and three quarters convex whorls (shell with seven and a half to eight whorls), separated by impressed crenellate sutures; whorls covered with fairly distant and prominent axial, almost perpendicular and straight, costulae, the interstices much wider than the costulae, smooth or with some vertical sculpture - the spiral sculpture of the protoconch is not continued on the teleoconch. In front view c. 15 costulae may be discerned on the body whorl above the aperture. Aperture ovate to squarish, always higher than wide, hardly obstructed by dental processes, peristome incrassate and (slightly) reflected,

white and glossy, dentition two-fold. On the right of paries a small but noticeable, vertical inrunning angular lamella, (weakly) connected with apex of labrum, sinus hardly developed or absent; on upper third of labrum a (sometimes weakly developed) labral tubercle, behind the labrum there is hardly a depression corresponding to this process; there is no outwardly observable columellar process, the aperture merely showing a slightly incrassate columella.

Measurements of shell: 7.0-8.0 x 2.2-2.5 mm, l/d 3.00-3.31, height last whorl 2.6-3.0 mm, aperture 1.9-2.1 x 1.7-1.9 mm, 7 1/2-8 whorls (see Table 2). Holotype (Fig. 13) 7.5 x 2.5 mm, l/d 3.00, height last whorl 2.9 mm, aperture 2.0 x 1.9 mm, 8 whorls.

Anatomy unknown.



13

Fig. 13. *Gulella* (*Silvigulella*) *turriformis* sp. nov., holotype, D.R.Congo, PNU 1257, Kilwezi, 7.5 x 2.5 mm (RBINS).

DISTRIBUTION

So far only known from the Upemba National Park in Katanga (formerly Shaba) Province, south-eastern D.R.Congo.

TYPE LOCALITY

D.R.Congo, Katanga Province, Upemba National Park, Kilwezi, c. 1000 m.

MATERIAL EXAMINED

D.R.Congo, Katanga Province, Upemba National Park, Munoï, right fork of the Lupiala River, gallery forest along the Lupiala River in the foothills of the escarpment, 890 m, 28.V-25.VI.1948, leg. W. ADAM (PNU 936: 1 paratype RBINS); Munoï, Katanga woodland², 890 m, 1-25.VI.1948, leg. W. ADAM (PNU 969: 3 paratypes RBINS); Kilwezi, 8.VIII-10.IX.1948, c. 1000 m, rocks

² Forêt katangaise, here translated as Katanga woodland. A Katanga woodland is a relatively open, deciduous forest in contrast to the gallery or fringing forest along rivers. In Katanga most of the tree species belong to the complex called 'Leguminosae', especially to the family Caesalpinaceae (*Brachystegia*, *Isoberlinia*, *Julbernardia*, *Berlinia*, *Afzelia*) and also to the families Mimosaceae (*Acacia*, *Albizia*) and Fabaceae (= Papilionaceae) (*Pterocarpus*); yet other very typical trees of the Katanga woodland belong to a variety of families e.g. the genera: *Parinari*, *Combretum*, *Anisophyllea*, *Sterculia*, *Marquesia*, *Monotes*, *Uapaca*.

Shrubs are numerous, among them representatives of the genera: *Abrus*, *Indigofera*, *Desmodium*, *Aeschynomene*, *Humularia*, *Kotschyia*, *Fadogia*, *Temnocalyx*. Grasses belong to the genera: *Andropogon*, *Antheplora*, *Heteropholis*, *Brachiaria*, *Tristachya*, *Hyparrhenia*. There are few ferns and relatively few epiphytes. One of the characteristics of the Katanga woodland is the abundance of high termitaries built by *Macrotermes* spp. The same type of Katanga woodland also occurs in large areas of Tanzania, Zambia and Angola. (J.-J. SYMOENS personal communication)

Table 2. Measurements in mm of ten shells of the type series of *Gulella* (*Silvigulella*) *turriformis* sp. nov. The holotype (Fig. 13) is marked by an *; all other shells are paratypes.

Locality	l x w	l/d	hw	h x w aperture	whorls
PNU 969	7.0 x 2.2	3.20	3.0	1.9 x 1.9	7 3/4
PNU 936	7.0 x 2.2	3.11	2.8	2.1 x 1.9	7 3/4
PNU 969	7.2 x 2.2	3.19	2.6	1.9 x 1.7	>7 (apex worn)
PNU 969	7.2 x 2.2	3.31	2.9	1.9 x 1.7	7 1/2
PNU 1257	7.2 x 2.2	3.31	2.9	2.0 x 1.9	7 1/2
PNU 1257	7.4 x 2.4	3.05	3.0	2.0 x 1.9	< 8
* PNU 1257	7.5 x 2.5	3.00	2.9	2.0 x 1.9	8
PNU 1257	7.6 x 2.4	3.13	2.9	2.0 x 1.9	8
PNU 1257	7.6 x 2.4	3.13	3.0	2.1 x 1.9	8
PNU 1257	8.0 x 2.5	3.20	2.9	2.1 x 1.9	8

near the source (PNU 1257: holotype RBINS, Fig. 13, 16 paratypes RBINS, 3 paratypes RMNH; 5 juvenile shells expressly excluded from the type series).

ETYMOLOGY

The specific epithet, *turriformis* (Latin), refers to the strikingly turriform shape of the shell.

DISCUSSION

The sample PNU 1257 (type locality) contains the holotype, 19 paratypes and 5 juvenile specimens. These juveniles measure between 4.2 and 5.1 mm, with 5 1/2 to 5 3/4 whorls. Absence of apertural dentition, closed umbilicus and the sharp labrum make these shells look like juvenile subulinids. Even in the smallest juvenile specimen available (4.2 mm long, 5 1/2 whorls) the umbilicus is completely closed and can hardly be considered rimate. Although there is no doubt that these juveniles belong to the species under discussion, they are expressly excluded from the type series and therefore cannot be considered paratypes. The 20 adult shells represent a fairly uniform sample as regards metric data: 7.2-8.0 x 2.2-2.5 mm, l/d 3.05-3.31, height last whorl 2.9-3.0 mm, aperture 2.0-2.1 x 1.9 mm, 7 1/2-8 whorls. These measurements are close to those of all available material (24 adult shells).

So far the new species is solely known from the Upemba National Park in the south-eastern districts of the D.R.Congo. The extensive collections from Malawi in the Leiden museum do not appear to contain this species; the distance between the Upemba National Park and the borders of Malawi amounts to only about 750 km in a straight line.

G. turriformis sp. nov. is a rather uncharacteristic representative of the taxon *Silvigulella*, here provisionally considered a subgenus. Shells that more or less look like *Gulella osborni* PILSBRY, 1919, the type species of *Silvigulella*, appear to be widely distributed in Central and West African forest environments (*vide* VAN BRUGGEN & VAN GOETHEM, 1997: 21), where they are bottom dwellers in the leaf litter. *G. turriformis* sp. nov. stands apart from the other taxa included in *Silvigulella* by virtue of its comparatively large size combined with apical spiral sculpture and a limited apertural dentition. The material examined is clearly demarcated as a separate entity among the dozens of other species in *Gulella s.l.* in the area.

Species (provisionally) classified with *Silvigulella* [*G. filicosta* (MORELET, 1868), *G. osborni* PILSBRY, 1919, *G. pisa* CONNOLLY, 1922, *G. shandae* CONNOLLY, 1930, *G. hanangi* ADAM, 1965, *G. holmi* ADAM, 1981, *G. lacus-paradisiaci* VERDCOURT, 1985] normally have shells that do not even reach half the size of the new species, while most have an aperture much more obstructed by apertural dentition. Some taxa referred to *Silvigulella* do show

evident spiral sculpture; sometimes the apex is worn or the sculpture is very fine indeed. The somewhat bulbous, sometimes almost inflated, protoconch may be another diagnostic character.

Dr A.J. DE WINTER has not encountered shells similar to the present new species in his West African material (RMNH).

The position of *Silvigulella* PILSBRY, 1919 (type species *Gulella osborni* PILSBRY, 1919) as a subgenus or perhaps 'section' of *Gulella* is far from clear. The intricate apertural dentition of most species precludes classification with *Streptostele* DOHRN, 1866, but the new species exhibits a minimal dentition such as is found in some species of *Streptostele*. However, the comparatively low number of whorls (8 instead of 7-11) combined with the presence of apical spiral sculpture makes one prefer to classify *Silvigulella* with *Gulella* rather than with *Streptostele*. Incidentally, the spiral sculpture on the protoconch in *Silvigulella* is not always easily detected and at times may require close observation under high power. It does not feature in any of the original descriptions of *G. filicosta*, *G. lacusparadisiaci*, *G. osborni*, *G. pisa* and *G. shandae*. The taxa *Silvigulella* and *Streptostele* are once again examples of streptaxid units (genera) that are not unequivocally separated; anatomical data and molecular studies may eventually resolve relationships within the family.

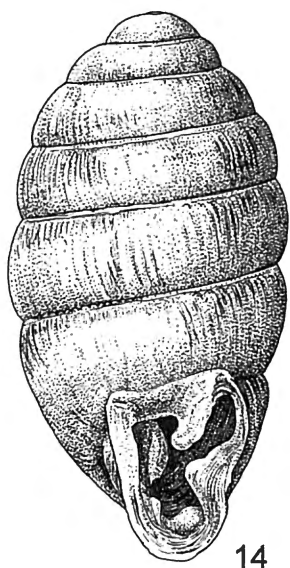
Gulella albinus sp. nov. (Fig. 14)

DIAGNOSIS

A species of *Gulella* characterized by a small, weakly costulate, shell with about six whorls and with a six-fold apertural dentition consisting of angular lamella, a labral complex, two basal denticles, and both inner and outer columellar processes.

DESCRIPTION

Shell (Fig. 14) small, subovate, greatest width at about the middle, (semi)transparent. Umbilicus subrimate to completely closed. Spire produced, sides convex to subparallel, apex flattened, obtusely conical. Whorls six to six and three-quarters, slightly convex, covered with weak and somewhat oblique costulae, at first giving the impression of an almost smooth surface, apical whorls smooth but with early traces of weak costulation. Sutures shallow, filiform to at most subcrenulate. Aperture subovate, somewhat laterally constricted, peristome slightly incrassate and reflected, obstructed by six-fold dentition: a large, perpendicular and inrunning angular lamella to the right of the middle of the paries, connected to apex of labrum and forming a large sinus, a large mamillate labral complex, protruding to the middle of the aperture and corresponding to a wide, shallow and noticeable outside depression, a blunt and small right basal process



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Fig. 14. *Gulella albinus* sp. nov., holotype, D.R.Congo, PNU 1383, between Mbuyé-Bala and Katongo Rivers, 3.4 x 1.7 mm (RBINS).

and a less deeply situated blunt and small left basal process, outer columellar process in the form of incrassate outer lip, inner columellar process large and almost vertical in position, reaching to about the middle of the aperture.

Measurements of shell: 2.7-3.4 x 1.7-1.8 mm, l/d 1.57-2.00, height last whorl 1.4-1.7 mm, aperture 0.9-1.1 x 0.7-0.9 mm, 6+-6 3/4 whorls (see Table 3). Holotype (Fig. 14) 3.4 x 1.7 mm, l/d 2.00, height last whorl 1.7 mm, aperture 1.1 x 0.9 mm, 6 3/4 whorls. Anatomy unknown.

DISTRIBUTION

So far only known from the Upemba National Park in Katanga (formerly Shaba) Province, south-eastern D.R.Congo.

TYPE LOCALITY

D.R.Congo, Katanga Province, Upemba National Park, between Mbuyé-Bala and Katongo Rivers, 1750 m.

MATERIAL EXAMINED

D.R.Congo, Katanga Province, Upemba National Park, at Lufwa River, gallery forest, 1810 m, 16.III.1948, leg. W. ADAM (PNU 494: 2 paratypes RBINS, 6 juvenile shells); Mukana, swamp forest, 1810 m, 18.III.1948, leg. W. ADAM (PNU 522: 2 paratypes RBINS); Katongo, tributary of Mubale River, gallery forest, 1750 m,

Table 3. Measurements in mm of 25 shells of the type series of *Gulella albinus* sp. nov. The holotype (Fig. 14) is marked by an *; all other shells are paratypes.

Locality	l x w	l/d	hw	h x w aperture	whorls
PNU 747	2.7 x 1.7	1.57	1.4	0.9 x 0.8	6 1/4
PNU 697	2.9 x 1.7	1.68	1.5	1.0 x 0.8	6 1/4+
PNU 710	2.9 x 1.7	1.74	1.5	0.9 x 0.7	6+
PNU 697	3.0 x 1.7	1.64	1.5	1.0 x 0.7	6 1/2
PNU 697	3.0 x 1.7	1.71	1.5	1.1 x 0.8	6 1/2
PNU 747	3.0 x 1.7	1.76	1.4	0.9 x 0.7	6 1/2
PNU 747	3.0 x 1.7	1.78	1.5	1.1 x 0.9	6 1/2
PNU 710	3.0 x 1.7	1.78	1.6	1.1 x 0.9	6 1/2
PNU 615	3.0 x 1.8	1.66	1.4	0.9 x 0.9	6 1/2
PNU 697	3.0 x 1.8	1.66	1.6	1.1 x 0.9	6 1/2
PNU 747	3.1 x 1.7	1.78	1.6	1.1 x 0.8	6 1/2
PNU 522	3.1 x 1.7	1.82	1.5	0.9 x 0.7	6 1/2
PNU 747	3.1 x 1.7	1.85	1.5	1.0 x 0.9	6 1/2
PNU 697	3.1 x 1.7	1.87	1.5	1.0 x 0.9	6 1/2
PNU 1116	3.1 x 1.8	1.69	1.4	1.0 x 0.9	6 1/2
PNU 615	3.1 x 1.8	1.70	1.6	0.9 x 0.7	6 1/2+
PNU 615	3.1 x 1.8	1.72	1.5	0.9 x 0.9	6 1/2+
PNU 747	3.2 x 1.7	1.82	1.5	1.1 x 0.9	6 1/2
PNU 522	3.2 x 1.7	1.82	1.6	1.1 x 0.9	6 3/4
PNU 494	3.2 x 1.7	1.82	1.6	1.1 x 0.9	6 3/4
PNU 697	3.2 x 1.7	1.89	1.5	1.1 x 0.8	6 1/2+
PNU 697	3.2 x 1.7	1.91	1.6	1.1 x 0.8	6 3/4
PNU 615	3.2 x 1.7	1.93	1.5	1.1 x 0.9	6 1/2
PNU 494	3.3 x 1.7	1.89	1.6	1.1 x 0.9	6 3/4
* PNU 1383	3.4 x 1.7	2.00	1.7	1.1 x 0.9	6 3/4

1.IV.1948, leg. W. ADAM (PNU 615: 2 paratypes RBINS, 2 paratypes RMNH, 1 defective shell); Lubanga, tributary of Senze River, gallery forest, 1750 m, 5.IV.1948, leg. W. ADAM (PNU 660; 1 paratype RBINS); Bwalo, gallery forest, 1750 m, 9.IV.1948, leg. W. ADAM (PNU 697: 7 paratypes RBINS, 2 paratypes RMNH, 3 juvenile shells); Mukelengia, tributary of Kalumengongo River, gallery forest, 1750 m, 12-13.IV.1948, leg. W. ADAM (PNU 710: 2 paratypes RBINS, 1 juvenile shell); Katongo, gallery forest, 1750 m, 15-16 and 21.IV.1948, leg. W. ADAM (PNU 747: 4 paratypes RBINS, 2 paratypes RMNH, 1 defective shell, 1 juvenile shell); Mukana, swamp forest, 1810 m, 15.VII.1948, leg. W. ADAM (PNU 1116: 1 paratype RBINS); between Mbuyé-Bala and Katongo Rivers, around an almost dry swamp with water-lilies, 1750 m, 28.IX.1948, leg. W. ADAM (PNU 1383: holotype RBINS, Fig. 14). Juvenile and defective shells have been expressly excluded from the type series.

ETYMOLOGY

albinus (Latin) = the white one, a noun in apposition, in allusion to the name of the famous Belgian herpetologist G.F. DE WITTE (1897-1980), under whose direction an enormous amount of fieldwork was done in the form of seven major expeditions in the period 1924-1958 in the former Belgian Congo, mainly in the national parks.

DISCUSSION

The interpretation of the apertural dentition as six-fold is not always easy. The labral complex may sometimes be interpreted as consisting of two cusps (resulting in a seven-fold dentition) and the swelling of the labrum forming the outer columellar process, at times may be hardly noticeable (resulting in a five-fold dentition). The holotype shell clearly represents the maximum development of the apertural dentition.

In some respects this species recalls the variable and widely distributed (as far north as southern Tanzania) *G. farquhari* (MELVILL & PONSONBY, 1895) as interpreted by VAN BRUGGEN (1992), but there are numerous, albeit sometimes minor, differences in apertural dentition, particularly in the basal sector. *G. farquhari* also has a more slender shell and usually a less triangular aperture. It is clear, however, that *G. albinus* sp. nov. does belong to the same group of species with minute shells which may be termed the *G. farquhari* group. A species from Tanzania (Uluguru Mts.), *G. kidundae* ADAM, 1965, obviously is another representative of this group, although its shell (4.7 mm) is larger than that of both *G. farquhari* (to 3.8 mm) and *G. albinus* sp. nov. (to 3.4 mm). There are also differences in apertural dentition, particularly as regards the massive labral complex in ADAM's species.

G. viae BURNUP, 1925, a South African endemic (*vide* VAN BRUGGEN, 1985), although outstanding by its comparatively enormously developed angular lamella in the

aperture, is likely to be another candidate for inclusion in the *G. farquhari* group.

There is a vague resemblance to *G. disseminata* (PRESTON, 1913) as treated by VAN BRUGGEN & VAN GOETHEM (1997: 16, Fig. 27), but in *G. albinus* sp. nov. the aperture is always somewhat laterally constricted, the configuration of the apertural dentition is different and the sutures are not crenellate. Close comparison also shows that the shells of *G. disseminata* are usually consistently more slender than those of the new taxon.

Acknowledgements

Acknowledgements are due to the following persons who have assisted in the preparation of the manuscript: Mrs D. OORTMAN (text), Mr H. VAN PAESSCHEN (lay-out of the figures) and Mr H. VAN LOEN (search for specimens), all RBINS. The professional drawings are all from the able hand of Mrs J. VAN MELDEREN-SERGYSLS. Dr B. VERDCOURT (Maidenhead, England, U.K.), Dr P. TATTERSFIELD (Chapellen-le-Frith, England/National Museum of Wales, Cardiff, Wales, U.K.) and Dr A.J. DE WINTER (RMNH) have given us the benefit of their knowledge of African land snails for which we are grateful indeed. Em. Prof. Dr J.-J. SYMOENS (Honorary Permanent Secretary of the Royal Academy of Overseas Sciences) kindly provided detailed information on the Katanga woodland.

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